

Working Experience

- 2016–Now **Researcher**, *Huawei Future Network Theory Laboratory*.
- 2015–2016 **Postdoctoral Fellow**, *Department of Computer Science and Engineering*, Chinese University of Hong Kong.

Interests: Distributed storage systems, CDN, Big data processing

Education

- 2011–2015 **PhD**, *Computer Science and Engineering*, Chinese University of Hong Kong.
Thesis Title: Enabling Efficient and Dependable Clustered File Systems through New Erasure Coding Techniques
- 2007–2011 **Bachelor of Engineering**, *Computer Science and Technology*, University of Science and Technology of China.

Projects and Open Source Softwares

- 2016 **ADN (Application-Driven Network) Prototype**
My contribution: Lead design and implementation of control plane
Briefing: ADN provides improved QoS guarantee by serving differentiated applications with dynamically-allocated network resources as well as dedicated transmission protocols.
- 2015 **Recovery-Oriented STAIR Codes in Storage Clusters**
My contribution: Lead implementation
Briefing: R-STAIR code is a storage-efficient code achieves high recovery performance for single failures as well as tolerance for burst failures. R-STAIR code outperform the state-of-the-art coding schemes (proposed by Facebook and Microsoft) by **3.6×** in the single failure recovery performance.
Project website: <http://ansrlab.cse.cuhk.edu.hk/software/rstair/>
GitHub repository: <https://github.com/rhli/hadoop-rstair/>
- 2015 **EAR: Encoding-Aware Replication in Clustered File Systems**
My contribution: Full design and implementation
Briefing: EAR enables efficient and reliable transition from replication to erasure coding. EAR boosts encoding performance by up to **120%** compared with conventional random replication.
Project website: <http://ansrlab.cse.cuhk.edu.hk/software/ear/>
GitHub repository: <https://github.com/rhli/hadoop-EAR/>
- 2014 **Degraded-First Task Scheduler for MapReduce in Erasure-Coded Storage Clusters**

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My contribution: Full design and implementation

Briefing: Degraded-First scheduler optimizes MapReduce performance in presence of component failures. It reduces the runtime of MapReduce job by up to **48%**.

Project website: <http://ansrlab.cse.cuhk.edu.hk/software/dfs/>

GitHub repository: <https://github.com/rhli/Degraded-First-Scheduler/>

2013 **CORE: Regenerating-Coding-Based Recovery for Single and Concurrent Failures**

My contribution: Lead full design and implementation

Briefing: CORE optimizes multi-node failure recovery of regenerating codes. The recovery throughput can be as high as **2.33×** that of widely deployed RS codes.

Project website: <http://ansrlab.cse.cuhk.edu.hk/software/core/>

2011 **NCFS: Network-Coding-Based Distributed File System**

My contribution: Implementation in file system layer

Briefing: NCFS is a proof-of-concept prototype of a Network-Coding-based Distributed File System. NCFS is a proxy-based file system that interconnects multiple storage nodes.

Project website: <http://ansrlab.cse.cuhk.edu.hk/software/ncfs/>

Publications

2017 Runhui Li, Yuchong Hu and Patrick P. C. Lee

Enabling Efficient and Reliable Transition from Replication to Erasure Coding for Clustered File Systems.

Transaction on Parallel and Distributed Systems (TPDS) (to appear)

2015 Mingqiang Li, Runhui Li and Patrick P. C. Lee

Relieving Both Storage and Recovery Burdens in Big Data Cluster with R-STAIR Code.

2015 USENIX Annual Technical Conference (ATC 2015) (Poster presentation), Santa Clara, CA, July 2015

2015 Runhui Li, Jian Lin and Patrick P. C. Lee

Enabling Concurrent Failure Recovery for Regenerating-Coding-Based Storage Systems: From Theory to Practice.

IEEE Transaction on Computers (TC), 64(7), pp. 1898-1911, July 2015

2015 Runhui Li, Yuchong Hu and Patrick P. C. Lee

Enabling Efficient and Reliable Transition from Replication to Erasure Coding for Clustered File Systems.

Proceedings of 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015) (Regular paper), Rio de Janeiro, Brazil, June 2015

(AR: 50/229 = 21.8%)

2015 Runhui Li and Patrick P. C. Lee

Making MapReduce Scheduling Effective in Erasure-Coded Storage Clusters.

Proceedings of the 21st IEEE International Workshop on Local and Metropolitan Area Networks (LANMAN 2015) (Invited paper), Beijing, China, April 2015

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- 2014 Runhui Li, Patrick P. C. Lee and Yuchong Hu
Degraded-First Scheduling for MapReduce in Erasure-Coded Storage Clusters.
 Proceedings of 44th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2014) (Regular paper), Atlanta, Georgia, June 2014
 (AR: $56/181 = 30.9\%$)
- 2014 Silei Xu, Runhui Li, Patrick P. C. Lee, Yunfeng Zhu, Liping Xiang, Yinlong Xu and John C. S. Lui
Single Disk Failure Recovery for X-Code-Based Parallel Storage Systems.
 IEEE Transaction on Computers (TC), 63(4), pp. 995-1007, April 2014
- 2013 Runhui Li, Jian Lin and Patrick P. C. Lee
CORE: Augmenting Regenerating-Coding-Based Recovery for Single and Concurrent Failures in Distributed Storage Systems.
 Proceedings of 29th IEEE Conference on Massive Data Storage (MSST 2013) (Short paper), Long Beach, CA, May 2013
 (AR: $(14 + 15)/109 = 26.6\%$)
- 2011 Liping Xiang, Yinlong Xu, John Lui, Qian Chang, Yubiao Pan and Runhui Li
A Hybrid Approach to Failed Disk Recovery Using RAID-6 Codes: Algorithms and Performance Evaluation.
 ACM Transaction on Storage, 7(3):11, Oct 2011

Honors and Awards

- 2015 The 45th IEEE/IFIP DSN Conference Student Travel Grant
- 2014 The 44th IEEE/IFIP DSN Conference Student Travel Grant
- 2011-2015 CUHK Postgraduate Studentship
- 2011 Undergraduate Excellent Thesis Award of USTC
- 2010 Citigroup Scholarship
- 2010 Excellent Thesis Award of Undergraduate Student Research Project of USTC
- 2009 Excellent Student Scholarship
- 2008 Excellent Student Scholarship
- 2007 Excellent Freshman Scholarship

Reference (Available upon Request)

Prof. Patrick P. C. Lee (Supervisor) **Prof. John C. S. Lui**

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